| Notice of Allowability | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/530,965 | KITAMURA ET AL. | |
| | Examiner | Art Unit | |
| | MICHAEL M. BERNSHTEYN | 1796 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *06/30/2009*.

2. ☒ The allowed claim(s) is/are *6,7,23,24 and 26-28*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20090903* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Michael M. Bernshteyn/
Examiner, Art Unit 1796

## DETAILED ACTION

1. This Office Action is a response to the remarks filed on June 30, 2009. Claims 6 and 7 have been amended; no claims have been cancelled or added.

2. In view of amendment(s) and remarks the objection of claims 6 and 7, the rejection of claims 6, 7, 23, 24 and 26-28 are rejected under 35 U.S.C. 112, 2nd paragraph, the rejection of claims 6 and 7 under 35 U.S.C. 102(b) as being anticipated by McGrath et al. (WO 02/25764 or U. S. Patent Application Publication 2002/0091225), and the rejections of claims 6, 7, 23, 24 and 26-28 under 35 U.S.C. 103(a) have been withdrawn.

3. Claims 1, 6-19, 23, 24, and 26-28 are pending; claims 6, 7, 23, 24 and 26-28 are active.

## EXAMINER'S AMENDMENT

4. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ms. Qi Zhao (Reg. No. 64,129) on September 8, 2009.

5. Claims 1 and 8-19 have been cancelled.

### *Allowable Subject Matter*

6. Claims 6, 7, 23, 24 and 26-28 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter: the present claims are allowable over the closest references: McGrath et al. (WO 02/25764 or U. S. Patent Application Publication 2002/0091225), Formato et al. (U. S. Patent 6,248,469 or WO 99/10165), and Suzuki et al. (JP 2002-203576).

McGrath discloses sulfonated copolymers and membranes that exhibit improved thermal stability as well as improved protonic conductivity in fuel cell applications.

McGrath discloses polymerizing a sulfonated activated aromatic monomer and an unsulfonated activated aromatic monomer with a suitable comonomer such as a bisphenol to produce a sulfonated aromatic copolymer.

McGrath discloses several embodiments, which include a sulfonated copolymer having the following chemical structure (page 3, line 4 through page 5, line 10).

Formato discloses a method of producing a membrane of the present invention comprises the steps of sulfonating the pores of the polymer substrate with a sulfonating agent (col. 8, lines 26-29). The composite SPEMs of the present invention comprise a porous polymer substrate interpenetrated with an ion-conducting material. The porous polymer substrate serves as a mechanically, thermally, chemically and oxidatively durable support for the ion- conducting material, e.g., polymer (col. 9, lines 14-19). The ion-conducting polymer substantially interpenetrates the micro infrastructure of the porous polymer substrate. This configuration, which can be made quite thin, promotes efficient proton transport across the membrane and minimizes water management problems. As a consequence, eventual membrane dehydration, parasitic losses and loss of ionic conductivity can be substantially prevented (col. 9, lines 30-35).

Formato discloses a fuel cell that includes polymer electrolyte membrane, which comprises an ion-conducting resin interpenetrated into a porous polymer substrate (col. 5, lines 62-64). Preferred substrates include polybenzazoles (PBZ) such as polybenzoxazole (PBO), polybenzothiazole (PBT) and polybenzimidazole (PBI) (col. 6, lines 25-30, Table 4, col. 19). The conductive resin not only fills the pores of the substrate, but also coats its two surfaces. The substrate has a porosity of about 40 to 90 percent (column 6, lines 22-24), which would give it an open surface porosity of at least 40 percent (Examples 9-13, col. 42, use PBO as the substrate polymer).

Suzuki discloses a composite ion exchange membrane comprising an ion exchange resin composition and a substrate membrane having open cells passing through the membrane wherein the substrate membrane is impregnated with the ion exchange resin composition (claim 1, page 1).

However, McGrath et al., Formato et al. and Suzuki do not disclose or fairly suggest a composite ion exchange membrane comprising an ion exchange resin composition, and a support membrane having continuous pores penetrating the support membrane, wherein said support membrane is a support membrane which accepts said ion exchange resin composition within said pore, and said ion exchange resin composition is an ion exchange resin composition which contains an ion exchange resin including linking units represented by Chemical Formula 2A and linking units represented by Chemical Formula 2B at a definite ratio, and particularly wherein the composite ion exchange membrane has a surface layer comprising said ion exchange resin composition on each side of said support membrane, wherein the thickness of

each of side surface layers is within a range of 1 to 50 μm and also is within a range which does not exceed half the total thickness of said composite ion exchange membrane, wherein at least one surface of said support membrane has an aperture ratio within a range of 40 to 95%, where the inherent viscosity of the ion exchange resin and the porosity of the support membrane are with the definite ranges as per instant claims 6 and 7.

8. As of the date of this Notice of Allowability, the Examiner has not located or identified any reference that can be used singularly or in combination with another reference including McGrath et al., Formato et al. and Suzuki to render the present invention anticipated or obvious to one of ordinary skill in the art.

9. In the light of the above discussion, it is evident as to why the present claims are patentable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delay, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reason for Allowance”.

## ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL M. BERNSHTEYN whose telephone number is (571)272-2411. The examiner can normally be reached on M-Th 8-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael M. Bernshteyn/
Examiner, Art Unit 1796

/M. M. B./
Examiner, Art Unit 1796

/David Wu/
Supervisory Patent Examiner, Art Unit 1796